

REMARKS

I. Introduction

Claims 12-26 are pending in the application. In the Office Action dated Aug. 28, 2009, the Examiner objected to claims 14 and 23; rejected claims 18, 25, and 26 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; rejected claims 12-14, 18, 19, 21, 23, and 24 under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 4,214,918 ("Gat"); rejected claims 16, 17, 22, 25, and 26 under 35 U.S.C. § 103(a) as being unpatentable over Gat in view of U.S. Pat. No. 4,509,461 ("Fan"); rejected claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Gat in view of U.S. Pat. No. 5,882,958 ("Wanlass"); and rejected claim 15 under 35 U.S.C. § 103(a) as being unpatentable over Gat in view of Japanese Pat. No. JP361030027A ("Higuchi"). In this Amendment, Applicants have amended claims 14, 18, 23, and 25, and cancelled claims 24 and 26.

II. Objection to Claims 14 and 23

In the Office Action the Examiner objected to claims 14 and 23. In this Amendment, Applicants have amended claim 14 as requested by the Examiner to replace "second direction" with "secondary direction." Additionally, Applicants have amended claim 23 as requested by the Examiner to replace "features size" with "feature sizes," and to replace "0.2um" with "0.2μm."

III. Rejection Under 35 U.S.C. § 112, First Paragraph

In the Office Action, the Examiner asserts that claims 18, 25, and 26 contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. With respect the element in claim 18 that an interconnect has a metal alloy or a doped metal with an impurity proportion of less than 5% by weight, Applicants have amended claim 18 to recite that an interconnect has a metal alloy or a doped metal with an impurity proportion of less than 5% of atoms or 5at%. One skilled in the art would understand the description in at least paragraphs [0015] and [0035] of the present application to

include the unit of measurement of an atomic percentage. Applicants request reconsideration.

With respect to claim 25, the Examiner asserts that with respect to the term “approximately 1cm/second,” there is no support in the specification for the term “approximately” with regard to a rate of 1 cm/second. Applicants respectfully disagree. Paragraph [0029] of the present application states:

[0029] After such a realization of very narrow (e.g. less than 0.1 micrometer) dual damascenes Cu interconnections 5, a fanned-out laser beam, for example, for producing a locally delimited thermal region W sweeps slowly along a primary direction x of the interconnects or metal-containing layers 5 and heats the latter to a local temperature within a range from approximately 150 degrees Celsius to 450 degrees Celsius. The movement (e.g. 1 cm/second) of the temperature from thus produced along the interconnect 5 enables a recrystallization of the small and randomly distributed copper grains from the first grain size 5A to an enlarged second grain size 5C. More precisely, a tendency towards the production of grains that are lengthened in the direction of movement or in the direction of interconnects 5 results in this case.

In the above-recited paragraph, 1 cm/second is given as an example. Applicants submit that one skilled in the art would understand from at least the above-recited paragraph that the movement of the temperature may be approximately 1 cm/second rather than exactly 1 cm/second as asserted by the Examiner. Accordingly, Applicants submit that the specification does support the term “approximately 1 cm/second.” Applicants request reconsideration.

IV. Rejections Under 35 U.S.C. §§ 102(b) and 103(a)

Independent claims 12, 23, and 25 each generally recite producing a locally delimited thermal region in a finely patterned-metal containing interconnect and moving the locally delimited thermal region in a direction of the interconnection in such a way that a recrystallization of the interconnect is carried out for the purpose of producing an interconnect having a second grain size, the second grain size being *lengthened* with respect to the first grain size *in the direction of the movement*. In the Office Action, the Examiner asserts that Gat teaches moving a locally delimited thermal region in a direction of an interconnect in such a way that a second grain size is lengthened with

respect to the first grain size *in the direction of the movement*. Applicants respectfully disagree.

Gat is directed to a method of forming polycrystalline semiconductor interconnections, resistors, and contacts by applying a radiation beam. In the cited portions of Gat, a laser beam is scanned across a semiconductor material and substrate. After the scanning the average grain size increases. However, Gat fails to teach moving a locally delimited thermal region such that a second grain size is ***lengthened in the direction of the movement*** with respect to the first grain size. Applicants note that while the Examiner asserts that Gat teaches each element of claim 12, the Office Action provides no explanation as to how Gat teaches producing a locally delimited thermal region and moving it in a direction of the interconnect so as to recrystallize the interconnect to produce in the interconnect a second, larger grain size ***which is lengthened in the direction of movement of the thermal region***.

Gat fails to teach producing a locally delimited thermal region in a finely patterned-metal containing interconnect and moving the locally delimited thermal region in a direction of the interconnection in such a way that a recrystallization of the interconnect is carried out for the purpose of producing an interconnect having a second grain size, the second grain size being ***lengthened*** with respect to the first grain size ***in the direction of the movement*** as recited in independent claims 12, 23, and 25. For at least this reason, Gat does not anticipate independent claims 12, 23, and 25 or any claim that depends on claim 12. Similarly, for at least this same reason, the combinations of Gat, Fan, Wanlass, and Higuchi as contemplated by the Examiner do not render unpatentable independent claims 12, 23, and 25 or any claim that depends on claim 12.

V. Conclusion

In view of the amendments to the claims and the foregoing remarks, Applicants submit that the pending claims are in condition for allowance. Reconsideration is therefore respectfully requested. If there are any questions concerning this Response, the Examiner is asked to phone the undersigned attorney at (312) 321-4200.

Respectfully submitted,

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